

Two--pion correlations in Au + Au collisions at 1.15A GeV

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We present BUU + CRAB two-pion correlation simulations and compare them to the correlations of pion pairs produced in Au + Au collisions at 1.15 A GeV, which have been measured with the EOS spectrometer. Experiment and simulations show a puzzling lack of agreement in the scaling of some size parameters with respect to system mass. Lambda parameters are generally near unity, signifying no exotic effects, while the time parameter τ is unexpectedly small for the Au + Au system.

Figure 1 shows the correlation functions for both Au and Ca systems. The simulation results here are for neutral pions, since we want to examine deviations from pure Gaussian behavior, free of the Coulomb repulsion between the pions. (Statistics of the experimental data are insufficient to make meaningful direct comparison with the momentum correlation functions from the simulations.) The curves labeled “unfiltered” use all phase-space pion source points. The curves labeled “filtered” use only pion source points <30 degrees in the C.M. frame and total momentum >180 MeV/c in the C.M. frame. The plot is made such that a pure Gaussian would appear as a straight line; that is, the abscissa is the square of the momentum difference \mathbf{k} , and the ordinate is the natural logarithm of the correlation function minus unity. The prototypical 2-boson correlation function of Gaussian source points is a Gaussian of unit height on a baseline of unity. Such a correlation function would yield a straight line with intercept of zero. It is evident in Fig.~1 that the correlation is not a single pure Gaussian, but there are no significant oscillations that our simple geometrical model led us to look for. There is no significant difference between the filtered and unfiltered sets, and the intercepts all come close to zero. However, there is a factor of 1.7 between the slopes of the correlation functions, close to what simple $A^{1/3}$ scaling would

predict. Thus, the BUU/CRAB simulations provide no explanation for the apparent mass-number independence of some size parameters.

Footnotes and References

*Submitted to EuroPhysics Journal A (1998)

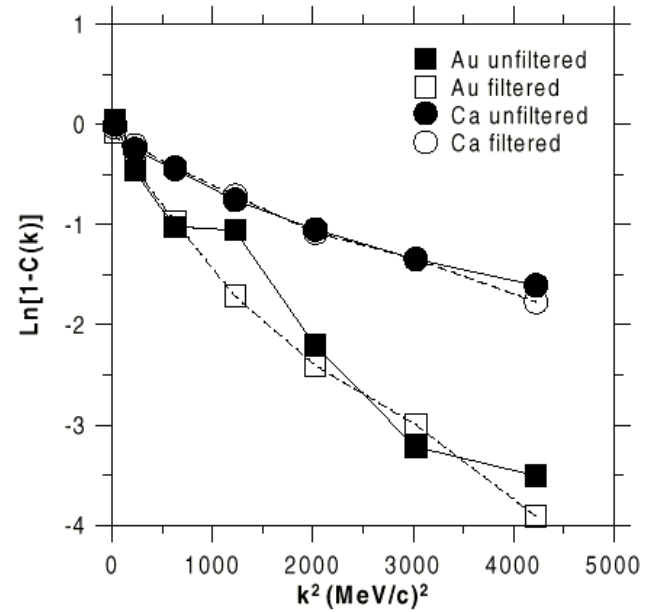


Fig. 1 BUU Simulations of neutral pion correlation functions for Au + Au and Ca + Ca at 1.15 A GeV..